A PRELIMINARY NOTE ON THE ABSORPTION OF THE HYDRANTHS OF HYDROID POLYPS.

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Loeb has found that when pieces of *Campanularia* are placed in dishes of sea water, the polyps in contact with the glass undergo a transformation and disappear completely into the stem. This process, he states, is "due to contact, and is accomplished by the liquefaction and subsequent withdrawal of the protoplasmic mass." In taking up this subject, at the suggestion of Professor Morgan, my wish was to see whether in this case a study of the histology would support Loeb's theory of the liquefaction of the protoplasm as a result of contact: and also whether the process in *Campanularia* resembles that in other hydroids in which absorption occurs, but is due merely to the change from natural to laboratory conditions. For the latter point, in addition to *Campanularia*, I examined *Eudendrium* and a few cases of *Pennaria*, both of which forms also readily absorb their hydranths.

To see if by chance *Campanularia* would also absorb its hydranths when not in contact, I made a set of experiments, placing the splinters of wood on which the hydroids were growing in dishes, so that, as far as possible, the animals would be in a normal position. Under these conditions I found that the polyps were absorbed as rapidly as when touching the glass. These results show at least that contact is not essential to the production of this phenomenon, and suggest the likelihood that the absorption is due to the same cause in all cases.

The beginning of the degenerative changes are first shown by the appearance of large numbers of spherical granules in the digestive current, and by an increase in its rapidity. Shortly after, the polyp, which is to be absorbed, contracts into its cup, and the tentacles fold closely over it. Gradually the polyp becomes shorter and shorter, and the tentacles pass from the length found during ordinary contraction to a knob-like stage, and later are completely absorbed. Towards the close of this period the hypostome also disappears. At this time the digestive current

which has been forced periodically from one end to the other of the hydroid-colony, may, by distending the remains of the polyp, delay absorption for a number of hours. If, however, the pressure of the current is not great, the polyp grows gradually smaller until only a small ball of material is left in the cup, and this is then drawn down into the stalk. The whole process may occur in six hours, or may be prolonged for two days or more.

A study of the prepared material shows that changes begin first in the endoderm cells of the body of the polyp, into the cavity of which are thrown fragments of degenerating endoderm and gland cells. This continues for some time, and is accompanied by the contraction of the supporting lamella, as a result of which the ectoderm changes from a flattened to a columnar form. The cells of the hypostome round up rapidly at a comparatively late stage, and are set free into the digestive cavity; the lamella contracting as before. In the tentacles the endoderm is also in process of degeneration, and later, when a break comes in the lamella at the base of the tentacle, the cells pass into the body cavity. The ectoderm cells in this region are thrown into folds which, seen from the surface, might easily give the effect of being fused, as noted by Loeb; but I have not seen any signs of real fusion — only many cases where the cells of different tentacles are brought into close contact. During this time the lamella of the tentacle breaks, and masses of nettle cells and ectoderm pass through the break into the digestive cavity. The broken ends of the lamella now draw together and form a hollow shell, which is frequently much distended by the pressure of the digestive current on the elastic lamella. Degeneration continues by the slow turning in of ectoderm and endoderm cells, until only a small fraction of the original polyp remains, and this is then drawn through the opening at the base of the cup. There are no signs, either external or internal, of any drawing back of protoplasm to form a part of the stalk previous to the final stage, but at this time the strands of protoplasm connecting the cœnosarc and perisarc at the end of the stalk are broken, and in sections the masses of nettle-forming cells, which usually lie in the ectoderm just below the polyp, can be seen to have moved farther down the stalk.

Examination of *Eudendrium* and of *Pennaria* show that the process is the same as that in *Campanularia*, except in those secondary points to which the structural differences of the hydroids would give rise. There being no cup, the tentacles remain separate during absorption, so that there can be no question of fusion taking place. The lower row of tentacles of *Pennaria* persists somewhat longer than do those on the hypostome, but both ultimately disappear, and in neither form is there a withdrawal into the stalk until the polyp has almost entirely degenerated.

The results show that in these three hydroids the method of absorption is the same. No trace of liquefaction of protoplasm, or of withdrawal of the polyp as a whole can be found. The absorption takes place by the degenerating cells of the endoderm and ectoderm being turned into the digestive tract of the colony.